## CLAIMS

1. Apparatus for detecting a vibration of an object adapted for rotation, comprising:

a plurality of magnetic field sensors for generating an RDIFF signal proportional to a magnetic field at a first location relative to the object and an LDIFF signal proportional to a magnetic field at a second location relative to the object;

at least two rotation detectors, wherein a first one of the rotation detectors is coupled to at least one of the magnetic field sensors and is responsive to the RDIFF signal for providing a first output signal indicative of rotation of the object and wherein a second one of the rotation detectors is coupled to at least one of the magnetic field sensors and is responsive to the LDIFF signal for providing a second output signal indicative of rotation of the object; and

at least one of:

a direction-change processor coupled to at least one of the rotation detectors to detect the vibration of the object in response to a change in the direction of rotation of the object as indicated by the output signal of the at least one rotation detector and to generate a direction-change output signal in response to the vibration;

a phase-overlap processor to identify a first signal region associated with the RDIFF signal and a second signal region associated with the LDIFF signal, and to identify an overlap of the first signal region and the second signal region and to generate a phase-overlap output signal in response to the overlap; and

a direction-agreement processor coupled to the at least two rotation detectors to detect the vibration of the object in response to a disagreement in the direction of rotation of the object as indicated by output signals of the at least two rotation detectors and to generate a direction-agreement output signal in response to the vibration.

2. The apparatus of Claim 1, wherein the apparatus comprises two rotation detectors, each of a type selected from a peak-referenced detector and a threshold detector.

3. The apparatus of Claim 1, wherein the apparatus comprises four rotation detectors, each of a type selected from a peak-referenced detector and a threshold detector.

4. The apparatus of Claim 1, wherein the first signal region is associated with a percentage range of a peak-to-peak magnitude of the RDIFF signal and the second signal region is associated with the same percentage range of a peak-to-peak magnitude of the LDIFF signal.

5. The apparatus of Claim 1, wherein the apparatus comprises at least two of the direction-change processor, the phase-overlap processor and the direction-agreement processor and wherein the apparatus further comprises a combining processor coupled to the at least two of the direction-change processor, the phase-overlap processor and the direction-agreement processor to combine the output signals of the at least two processors to provide a vibration-decision output signal indicative of the vibration of the object.

6. The apparatus of Claim 1, wherein the apparatus is adapted for use in an automobile.

7. The apparatus of Claim 1, wherein the apparatus comprises the direction-change processor and wherein the apparatus further comprises a second direction-change processor coupled to a different one of the at least two rotation detectors to generate a second direction-change output signal in response to the vibration.

8. The apparatus of Claim 1, wherein the apparatus comprises the direction-agreement processor and four rotation detectors providing output signals coupled to the direction-agreement processor, wherein two of the four rotation detectors are threshold detectors and two of the four rotation detectors are peak-referenced detectors and wherein the vibration of the object is detected in response to a disagreement in the direction of rotation of the object as indicated by the output signals of the two threshold detectors with the direction of rotation of the object as indicated by the output signals of the two peak-referenced detectors.

9. Apparatus for detecting a vibration of an object adapted for rotation, comprising:

a plurality of magnetic field sensors for generating an RDIFF signal proportional to a magnetic field at a first location relative to the object and an LDIFF signal proportional to a magnetic field at a second location relative to the object;

at least two rotation detectors, wherein a first one of the rotation detectors is coupled to at least one of the magnetic field sensors and is responsive to the RDIFF signal for providing a first output signal indicative of rotation of the object and wherein a second one of the rotation detectors is coupled to at least one of the magnetic field sensors and is responsive to the LDIFF signal for providing a second output signal indicative of rotation of the object; and

a vibration processor responsive to the first and second output signals from the at least two rotation detectors for detecting the vibration of the object.

10. The apparatus of Claim 9, wherein the apparatus comprises two rotation detectors, each of a type selected from a peak-referenced detector and a threshold detector.

11. The apparatus of Claim 9, wherein the apparatus comprises four rotation detectors, each of a type selected from a peak-referenced detector and a threshold detector.

12. The apparatus of Claim 9, wherein the vibration processor comprises more than one vibration detector each having a respective output and further includes a combining processor for combining the respective outputs to provide a vibration-decision output indicative of the vibration of the object.

13. The apparatus of Claim 9, wherein the apparatus is adapted for use in an automobile.

14. A method for detecting a vibration of an object, comprising:

providing a first output signal indicative of a rotation of the object with a first rotation detector;

providing a second output signal indicative of a rotation of the object with a second

rotation detector;

detecting a change in direction of rotation of the object from the first and the second output signals; and

generating a direction-change output signal in response to the change in direction.

15. The method of Claim 14, wherein the first rotation detector is a threshold detector and the second rotation detector is a threshold detector.

16. The method of Claim 14, wherein the first rotation detector is a peak-referenced detector and the second rotation detector is a peak-referenced detector.

17. The method of Claim 14, further comprising:

providing a third output signal indicative of a rotation of the object with a third rotation detector;

providing a fourth output signal indicative of a rotation of the object with a fourth rotation detector;

detecting a first direction of rotation of the object with the first rotation detector and with the second rotation detector;

detecting a second direction of rotation of the object with the third rotation detector and with the fourth rotation detector;

determining whether the first direction of rotation is the same as the second direction of rotation; and

generating a direction-agreement output signal in response to the determination.

18. The method of Claim 17, wherein the first rotation detector is a threshold detector, the second rotation detector is a threshold detector, the third rotation detector is a peak-referenced detector, and the fourth rotation detector is a peak-referenced detector.

19. The method of Claim 17, further comprising combining the direction-change output signal and the direction-agreement output signal to provide a vibration-decision output signal

indicative of the vibration of the object.

20. The method of Claim 17, further comprising:

detecting a magnetic field with a first magnetic field sensor at a first location relative to the object to provide an RDIFF signal;

detecting a magnetic field with a second magnetic field sensor at a second location relative to the object to provide an LDIFF signal;

identifying a first signal region associated with the RDIFF signal and a second signal region associated with the LDIFF signal;

identifying an overlap of the first signal region and the second signal region; and

generating a phase-overlap output signal in response to the overlap.

21. The method of Claim 20, wherein the first signal region is associated with a percentage range of a peak-to-peak magnitude of the RDIFF signal and the second signal region is associated with the same percentage range of a peak-to-peak magnitude of the LDIFF signal.

22. The method of Claim 20, further comprising combining selected ones of the direction-change output signal, the direction-agreement output signal, and the phase-overlap output signal to provide a vibration-decision output signal indicative of the vibration of the object.

23. The method of Claim 14, further comprising:

detecting a magnetic field with a first magnetic field sensor at a first location relative to the object to provide an RDIFF signal;

detecting a magnetic field with a second magnetic field sensor at a second location relative to the object to provide an LDIFF signal;

identifying a first signal region associated with the RDIFF signal and a second signal region associated with the LDIFF signal;

identifying an overlap of the first signal region and the second signal region; and

generating a phase-overlap output signal in response to the overlap.

24. The method of Claim 23, wherein the first signal region is associated with a percentage range of a peak-to-peak magnitude of the RDIFF signal and the second signal region is associated with the same percentage range of a peak-to-peak magnitude of the LDIFF signal.

25. The method of Claim 23, further comprising combining the direction-change output signal and the phase-overlap output signal to provide a vibration-decision output signal indicative of the vibration of the object.

26. A method of detecting a rotation of an object, comprising:

providing a first output signal indicative of a rotation of the object with a first rotation detector;

providing a second output signal indicative of a rotation of the object with a second rotation detector;

providing a third output signal indicative of a rotation of the object with a third rotation detector;

providing a fourth output signal indicative of a rotation of the object with a fourth rotation detector;

detecting a first direction of rotation of the object with the first rotation detector and with the second rotation detector;

detecting a second direction of rotation of the object with the third rotation detector and with the fourth rotation detector;

determining whether the first direction of rotation is the same as the second direction of rotation; and

generating a direction-agreement output signal in response to the determination.

27. The method of Claim 26, wherein the first rotation detector is a threshold detector, the second rotation detector is a threshold detector, the third rotation detector is a peak-referenced detector, and the fourth rotation detector is a peak-referenced detector.

28. The method of Claim 26, further comprising:

detecting a magnetic field with a first magnetic field sensor at a first location relative to the object to provide an RDIFF signal;

detecting a magnetic field with a second magnetic field sensor at a second location relative to the object to provide an LDIFF signal;

identifying a first signal region associated with the RDIFF signal and a second signal region associated with the LDIFF signal;

identifying an overlap of the first signal region and the second signal region; and

generating a phase-overlap output signal in response to the overlap.

29. The method of Claim 28, wherein the first signal region is associated with a percentage range of a peak-to-peak magnitude of the RDIFF signal and the second signal region is associated with the same percentage range of a peak-to-peak magnitude of the LDIFF signal.

30. The method of Claim 28, further comprising combining the direction-agreement output signal and the phase-overlap output signal to provide a vibration-decision output signal indicative of the vibration of the object.

31. A method of detecting a rotation of an object, comprising:

detecting a magnetic field with a first magnetic field sensor at a first location relative to the object to provide an RDIFF signal;

detecting a magnetic field with a second magnetic field sensor at a second location relative to the object to provide an LDIFF signal;

identifying a first signal region associated with the RDIFF signal and a second signal region associated with the LDIFF signal;

identifying an overlap of the first signal region and the second signal region; and

generating a phase-overlap output signal in response to the overlap.

32. The method of Claim 31, wherein the first signal region is associated with a percentage range of a peak-to-peak magnitude of the RDIFF signal and the second signal region is associated with the same percentage range of a peak-to-peak magnitude of the LDIFF signal.

33. A peak-referenced detector for detecting rotation of an object adapted to rotate, comprising:

a DIFF signal generator adapted to generate a DIFF signal proportional to magnetic field generated by the object when rotating;

mean for identifying a positive peak value corresponding to a positive peak of the DIFF signal;

means for identifying a negative peak value corresponding to a negative peak of the DIFF signal;

means for generating a first threshold as a first predetermined percentage below the positive peak value;

means for generating a second threshold as a second predetermined percentage above the negative peak value; and

a comparator for comparing the first and second thresholds to the DIFF signal to generate an output signal indicative of the rotation of the object.

34. The apparatus of Claim 33, wherein the means for generating the positive peak value and the means for generating the negative peak value comprise a PDAC and an NDAC.

35. The apparatus of Claim 33, wherein the means for generating the first threshold and the means for generating the second threshold each comprise a resistor ladder.

36. The apparatus of Claim 33, wherein the first and second predetermined percentages are each about fifteen percent.